JA

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/806,087	03/22/2004	Rajan Rajendran	0315-000505/REA	1688

27572 7590 04/04/2005

HARNESS, DICKEY & PIERCE, P.L.C.
P.O. BOX 828
BLOOMFIELD HILLS, MI 48303

EXAMINER	
SAYOC, EMMANUEL	
ART UNIT	**PAPER NUMBER**
3746	

DATE MAILED: 04/04/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/806,087	RAJENDRAN ET AL.	
	Examiner	Art Unit	
	Emmanuel Sayoc	3746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 March 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-72* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *1-29 and 71* is/are allowed.

6)☒ Claim(s) *30-70 and 72* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *22 March 2004* is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *3/22/2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claim 30 is rejected under 35 U.S.C. 102(b) as being anticipated by Suefuji et al. (U.S. 6,267,572 B1).

Suefuji et al. in Figure 1, teaches a dual scroll compressor unit comprising an outer shell (2) defining a suction pressure zone (shown not enumerated), a first scroll compressor (4a, 22a) disposed within said suction pressure zone of said shell (2), said first scroll compressor (4a, 22a) including a first non-orbiting scroll member (4a) interleaved with a first orbiting scroll member (22a), said first orbiting scroll member (22a) being mounted for radial movement within said outer shell (2); a second scroll compressor (4b, 22b) disposed within said suction pressure zone of said shell (2), said second scroll compressor (4b, 22b) including a second non-orbiting scroll member (4b) interleaved with a second orbiting scroll member (22b), said second orbiting scroll member (22b) being mounted for radial movement within said outer shell (2); a drive shaft (20) extending between and coupled to each of said first (22a) and second (22b) orbiting scroll members, said drive shaft (20) operable to drive said first

(4a, 22a) and second (4b, 22b) scroll compressors for compressing fluid disposed within said suction pressure zone; and a motor (8) disposed within said suction pressure zone shell (2) between said first (4a, 22a) and second (4b, 22b) scroll compressors, said motor being drivingly coupled to said drive shaft (20).

Mounting frames (11a,b 12a,b) are placed to support the motor (8) and shaft (20).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 31-39, 40, and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suefuji et al., and in further view of Doepker et al. (U.S. 6,213,731).

Suefuji et al. in Figure 1, teaches a dual scroll compressor unit comprising an outer shell (2) defining a suction pressure zone (shown not enumerated) a first scroll compressor (4a, 22a) disposed within said suction pressure zone of said shell (2), said first scroll compressor comprising a first scroll member (22a) having a first end plate (5a) and a first spiral wrap (6a) extending therefrom; a second scroll member (4a) having a second end plate (23a) and a second spiral wrap (24a) extending therefrom, said first (22a) and second (4a) scroll members being positioned with said first (6a) and second (24a) spiral wraps interleaved with each other; a second scroll compressor (4b, 22b) disposed within said suction pressure zone of said shell (2), said second scroll compressor comprising; a third scroll member (22b) having a third end plate (5b) and a third spiral wrap (6b) extending therefrom; a fourth scroll member (4b) having a fourth end plate (23b) and a fourth spiral wrap (24b) extending therefrom, said third (22b) and fourth (4b) scroll members being positioned with said third (5b) and fourth (24b) spiral wraps interleaved with each other; a drive shaft (20) extending between and coupled to each of said first (22a) and third (22b) scroll members said drive shaft (20) operable to drive said first (4a, 22a) and second (4b, 22b) scroll compressors for compressing fluid disposed within said suction pressure zone.

Sealing surfaces (wrap engagement to end walls) of said first (22a, 22b) and second (4a, 4b) scroll members are in sealing relationship to close off first fluid pockets (compression chambers). The Suefuji device differs from the claimed invention in that

there is no explicit teaching of said second scroll member being movable between a first relationship in which sealing surfaces of said first and second scroll members are in sealing relationship to close off first fluid pockets and a second relationship wherein at least one of said sealing surfaces of said first and second scroll members are spaced apart to define a first leakage path between said first fluid pockets. Furthermore there is no explicit teaching of a first fluid operated piston secured to said second scroll member, where said first fluid operated piston being actuatable to apply a force to said second scroll member to move said second scroll member between said first relationship where said first scroll compressor operates at substantially full capacity and said second relationship where said first scroll compressor operates at substantially zero capacity.

Within the art at the time the invention was made, it was well known to adjust the axial engagement of the fixed scroll relative to the orbiting scroll in order to control leakage between the engaging wraps and the end plates, thus modulating the capacity of the scroll compressor. Doepker et al., in Figures 1 and 2, teach a scroll compressor with an orbiting scroll and end plate assembly (26) and a fixed scroll and end plate assembly (32). The fixed scroll (32) is actuated axially to control the capacity or to unload the compressor – see column 2 line 3 to 24, and column 3 line 64 to column 5 line 56. Sealing surfaces (wrap engagement to end walls) of said first (26) and second (32) scroll members are in sealing relationship to close off first fluid pockets (compression chambers). The second scroll member (32) is being movable between a first relationship (Figure 1) in which sealing surfaces of said first (26) and second (32)

scroll members are in sealing relationship to close off first fluid pockets, and a second relationship (Figure 2) wherein at least one of said sealing surfaces of said first (26) and second (32) scroll members are spaced apart to define a first leakage path between said first fluid pockets. Furthermore a first fluid operated piston (70) is secured to said second scroll member (32), where said first fluid operated piston (70) being actuatable to apply a force to said second scroll member (32) to move said second scroll member (32) between said first relationship (Figure 1) where said first scroll compressor operates at substantially full capacity and said second relationship (Figure 2) where said first scroll compressor operates at substantially zero capacity. The Doepker et al. capacity modulation system uses a pulse width modulated system (column 3 line 10, and column 5 line 7-26) to operate a solenoid valve (74), which in turn regulates discharge and suction pressures that actuate the piston (74). Pulse width modulation constitutes operation on a time pulsed manner. Therefore it would have been obvious to one of ordinary skill in the art at time the invention was made to modify the Suefuji et al. device by incorporating the fixed scroll axial capacity modulation via a fluid operated piston and pulse width modulated solenoid valve, as taught by Doepker et al., in order to be able to modulate the capacity of the scroll compressors for different load or demand conditions given readily available discharge and suction pressures. It would have been further obvious to apply the same modulation system to the second scroll compressor in Suefuji et al. such that all modulation components, such as the fluid operated piston are reproduced in the second compressor.

In the combination set forth above, the chamber (92 Doepker et al.) constitutes a fluid pressure chamber operative to apply an axial force on the piston (70). Furthermore, in Doepker et al. the first passage (94) supplies fluid to the chamber (92). The passage (98) serves to vent the pressure chamber (94). As these are essential elements to the capacity modulation system, it would have been further obvious to incorporate these in Suefuji et al. in the combination suggested above.

Suefuji et al. suction ports (32a, 32b) constitute first and second fluid injection fittings extending through the outer shell (2) for implementing a first and second vapor injection system for the first (4a, 22a) and second (4b, 22b) scroll compressors.

6. Claims 30, 42-49, 54-56, and 65-70, are rejected under 35 U.S.C. 103(a) as being unpatentable over Murayama et al. (U.S. 5,211,031), and in further view of Suefuji et al.

Murayama et al. in Figure 1, teaches a dual scroll compressor unit comprising an outer shell (2) defining a suction pressure zone (shown not enumerated), a first scroll compressor (4 left) disposed within said suction pressure zone of said shell (2), said first scroll compressor (4 left) including a first non-orbiting scroll member (4 left outer scroll) interleaved with a first orbiting scroll member (4 inner scroll attached to shaft 5 left), said first orbiting scroll member (4 left) being mounted for radial movement within said outer shell (2); a second scroll compressor (4 right) disposed within said suction pressure zone of said shell (2), said second scroll compressor (4 right) including a second non-orbiting scroll member (4 right outer scroll) interleaved with a second

orbiting scroll member (4 right inner scroll attached to shaft 5 right), said second orbiting scroll member (4 right inner scroll attached to shaft 5 right) being mounted for radial movement within said outer shell (2). Two variable speed motors (7) drive the first and second scroll compressors (4). The Murayama et al. device differs from the claimed invention in that the drive shaft (5 left or right) does not extending between and couple to each of said first and second orbiting scroll members, where said drive shaft is operable to drive said first (4 left) and second (4 right) scroll compressors for compressing fluid disposed within said suction pressure zone. Furthermore there is no explicit teaching that a motor is disposed within said suction pressure zone shell between said first and second scroll compressors, and said motor being drivingly coupled to said drive shaft. Suefuji et al. teaches a similar dual scroll compressor system that teaches driving two compressors with one motor (8). Therefore it would have been obvious to one of ordinary skill in the art at time the invention was made to modify the Murayama et al. device by incorporating the single motor drive configuration, as taught by Suefuji et al., in order to reduce drive costs and motor control complexity by reducing the dual motors to a single motor. In such a combination, the Murayama et al. mounting frames (3) are placed to support the motor (8) and shaft (20) and are within the suction pressure zone. Furthermore in the combination, the drive shaft (Murayama et al. 5 left or right) would have extended between and would have coupled each of said first and second orbiting scroll members (4 inner left and right scroll members), where said drive shaft (5) is operable to drive said first (4 left) and second (4 right) scroll compressors for compressing fluid disposed within said suction pressure zone. Finally,

the single Murayama et al. motor (7), which obviously has a rotor and stator, and the scroll compressors (4 right and left) would have been disposed within said suction pressure zone shell between said first and second scroll compressors, and said motor would be drivingly coupled to said drive shaft (5). The Murayama et al. device includes a main bearing housing (shown not enumerated) on each scroll compressor (4 right and left) attached to the mounting frames (3) on each end of the compressor (1). The outlets (40) are connected to first and second discharge chambers (shown not enumerated) of the scroll compressors (4 left and right).

Murayama et al. suction ports (see suction tube extending down to oil sump and connected to shaft 5) constitute first and second fluid injection fittings extending through the outer shell (2) for implementing a first and second vapor injection system for the first (4 left) and second (4 right) scroll compressors. These suction tubes constitute first and second oil pumps.

As seen in Murayama et al. Figure 1, and in the combination outlined above, the shaft (5) ends have an eccentric section with a tip, which constitutes a pin, eccentrically offset from the central axis of the shaft (5) thus defining a pin axis eccentrically offset from the central axis of the shaft (5).

As seen in Murayama et al. Figure 1, a single suction inlet (44) is in communication with the suction pressure zone. The compressor is reversible allowing suction or discharge through any given port.

The cylindrical shell (2) has two end caps connected on either side of the shell (2).

With respect to welding, in MPEP 2173, Product-by-Process Claims, the determination of patentability is based on the product itself (not the process). The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior-art, the claim is unpatentable even though the prior-art product was made by a different process.

7. Claims 50-53, and 57-64, are rejected under 35 U.S.C. 103(a) as being unpatentable over Murayama et al., as modified by Suefuji et al., as applied to claim 30, 55, and 57, and in further view of Doepker et al.

Murayama et al., as modified by Suefuji et al. set forth a device as described above, which is substantially analogous to the claimed invention. The Murayama et al., as modified by Suefuji et al., device differs from the claimed invention in that there is no explicit teaching of the compressor having a pulse width modulated capacity modulating system.

Within the art at the time the invention was made, it was well known to adjust the axial engagement of the fixed scroll relative to the orbiting scroll in order to control leakage between the engaging wraps and the end plates, thus modulating the capacity of the scroll compressor. Doepker et al., in Figures 1 and 2, teach a scroll compressor with an orbiting scroll and end plate assembly (26) and a fixed scroll and end plate assembly (32). The fixed scroll (32) is actuated axially to control the capacity or to unload the compressor – see column 2 line 3 to 24, and column 3 line 64 to column 5

line 56. Sealing surfaces (wrap engagement to end walls) of said first (26) and second (32) scroll members are in sealing relationship to close off first fluid pockets (compression chambers). The second scroll member (32) is being movable between a first relationship (Figure 1) in which sealing surfaces of said first (26) and second (32) scroll members are in sealing relationship to close off first fluid pockets, and a second relationship (Figure 2) wherein at least one of said sealing surfaces of said first (26) and second (32) scroll members are spaced apart to define a first leakage path between said first fluid pockets. Furthermore a first fluid operated piston (70) is secured to said second scroll member (32), where said first fluid operated piston (70) being actuatable to apply a force to said second scroll member (32) to move said second scroll member (32) between said first relationship (Figure 1) where said first scroll compressor operates at substantially full capacity and said second relationship (Figure 2) where said first scroll compressor operates at substantially zero capacity. The Doepker et al. capacity modulation system uses a pulse width modulated system (column 3 line 10, and column 5 line 7-26) to operate a solenoid valve (74), which in turn regulates discharge and suction pressures that actuate the piston (74). Pulse width modulation constitutes operation on a time pulsed manner. Therefore it would have been obvious to one of ordinary skill in the art at time the invention was made to further modify the Murayama et al., as modified by Suefuji et al., device by incorporating the fixed scroll axial capacity modulation via a fluid operated piston and pulse width modulated solenoid valve, as taught by Doepker et al., in order to be able to modulate the capacity

of the scroll compressors for different load and demand conditions given readily available discharge and suction pressures.

8. Claim 72 is rejected under 35 U.S.C. 103(a) as being unpatentable over Suefuji et al., as modified by Doepker et al., as applied to claim 31, and in further view of Osada et al. (JP 10-037866).

Suefuji et al., as modified by Doepker et al. set forth a device as described above, which is substantially analogous to the claimed invention. The outer shell (2) of Suefuji et al., is cylindrical. The Suefuji et al., as modified by Doepker et al., device differs from the claimed invention in that there is no explicit teaching of the compressor comprising an oil sump disposed along a cylindrical sidewall of the outer shell. Osada et al. in Figure 1, teach that it was well known in the art to supply an oil sump with associated oil pumps to the scroll compressors to provide lubrication. Therefore it would have been obvious to one of ordinary skill in the art at time the invention was made to further modify the Suefuji et al., as modified by Doepker et al., device by incorporating the oil sump, as taught by Osada et al., in order to provide compressor lubrication.

Allowable Subject Matter

9. Claims 1-29, and 71 are allowed over the prior art.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following references are cited to further show the state of the art with respect to scroll compressors.

U.S. Pat. 5,741,120 to Bass et al.

U.S. Pat. 5,609,478 to Utter et al.

Japanese Pat. 02-11882 to Onoda et al.

Japanese Pat. 404121478 A to Nagatomo et al.

Japanese Pat. 406002670 A to Tsubono et al.

Japanese Pat. 404121474 A to Nagatomo et al.

Contact Information

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Emmanuel Sayoc whose telephone number is (571) 272 4832. The examiner can normally be reached on M-F 8-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cheryl Tyler can be reached on (571) 272-4834. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Emmanuel Sayoc
Examiner
Art Unit 3746

CHERYL TYLER
SUPERVISORY PATENT EXAMINER

ECS